Iceberg Monitoring Within the North American Ice Service

LCDR Mike Krause
U.S. Coast Guard Headquarters
Chief, Mobility and Ice Operations Division
July 2013

Outline

I. Mission overview

- International Ice Patrol
- North American Ice Service

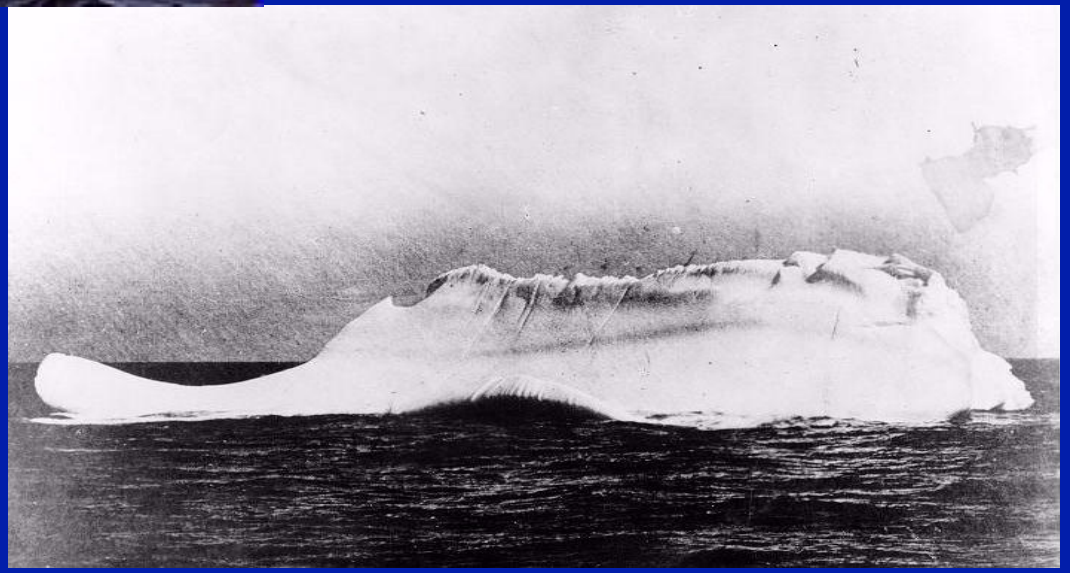
II. Joint mission execution

- Reconnaissance
- Products
- Benefits

III. NAIS initiatives

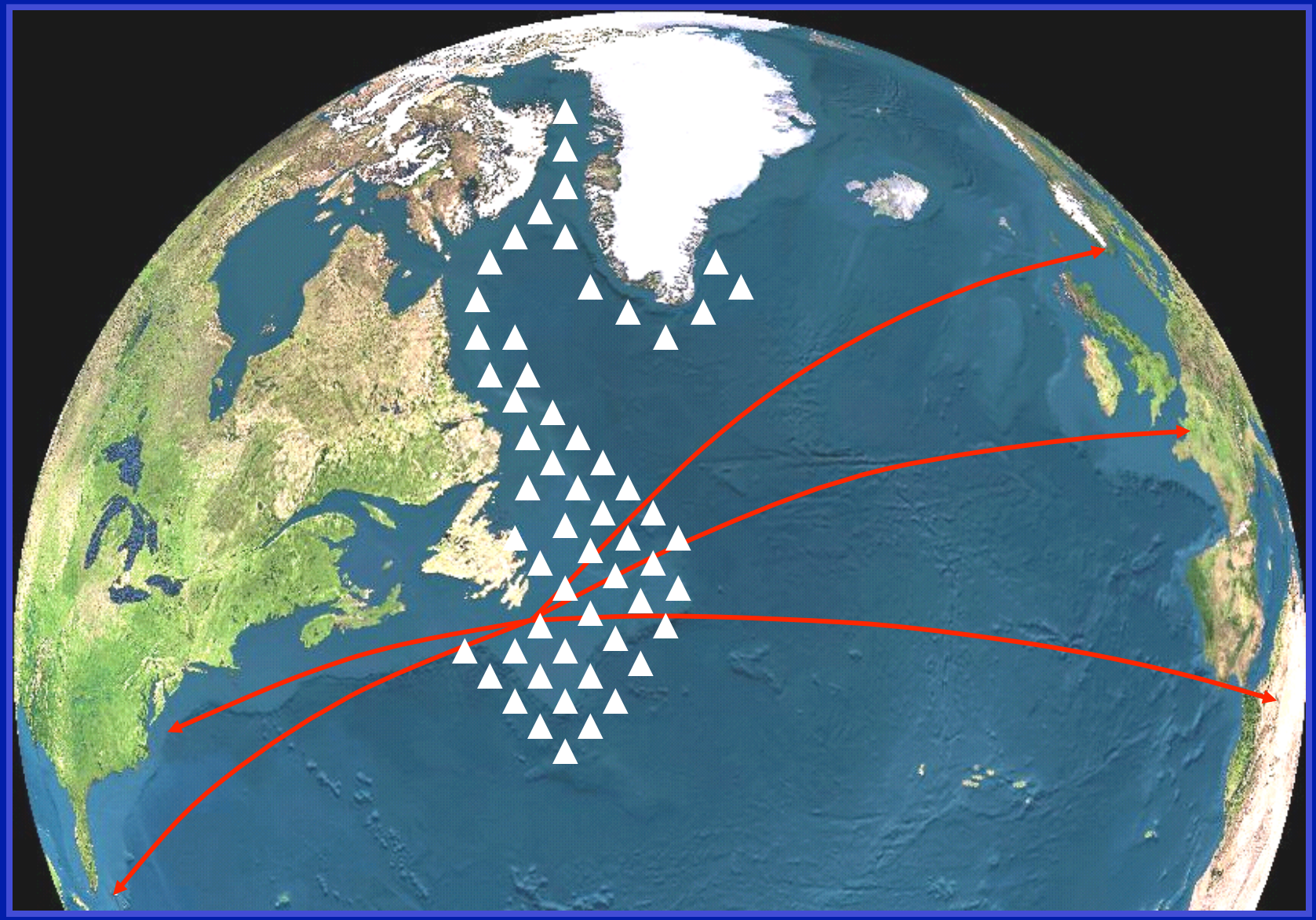
- Future Customer Needs
- Future Area of Responsibility
- Future of Mission Execution

Mission History

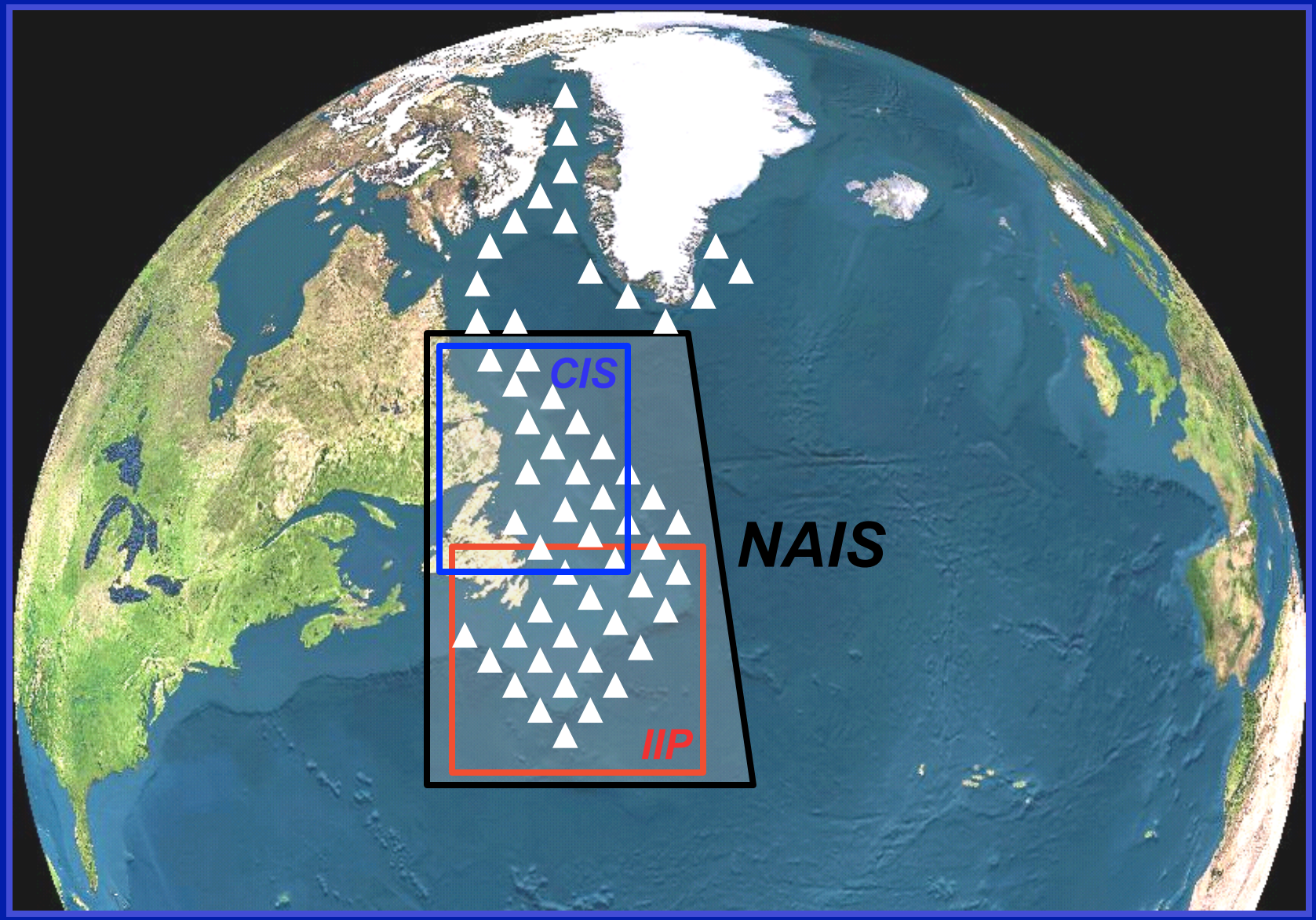


Do Modern Ships Hit Icebergs?

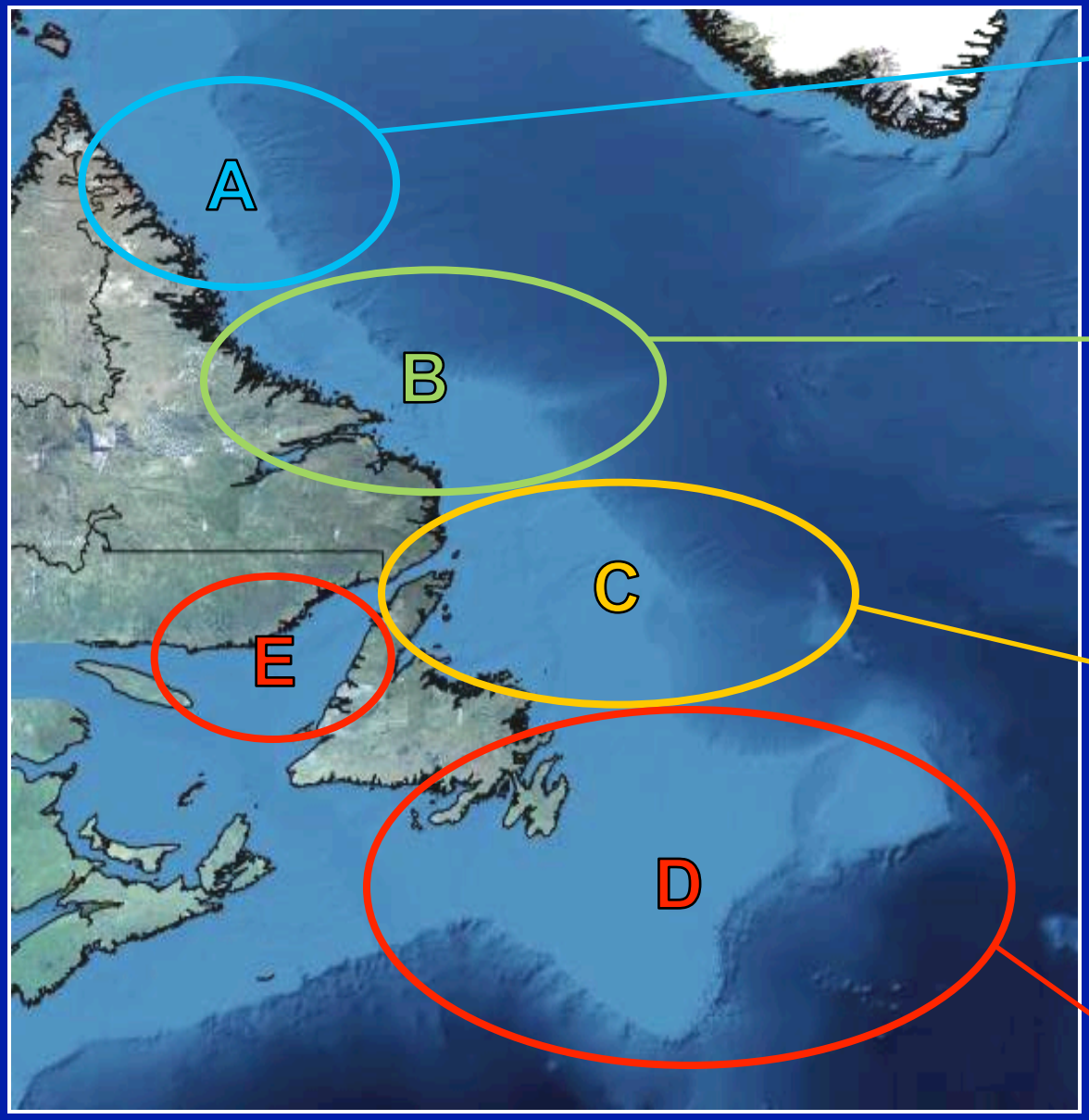
International Ice Patrol Mission: monitor iceberg danger near the Grand Banks of Newfoundland and provide the iceberg limit to the maritime community



North American Ice Service Mission: leverage the strengths of each service to monitor and provide the highest quality, timely, and accurate ice analysis, in order to meet the needs of the maritime interests of the United States and Canadian governments



NAIS Joint Reconnaissance Strategy



A No sea ice – satellite surveillance once per month.

With sea ice – no surveillance, no dedicated flights.

B Limit is here or further north – fly once per month.

Limit to the south – no flights.

Satellite surveillance as available.

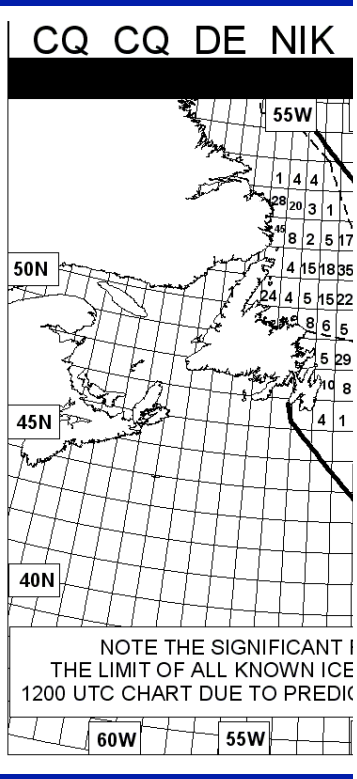
C Limit here – fly every 7-14 days.

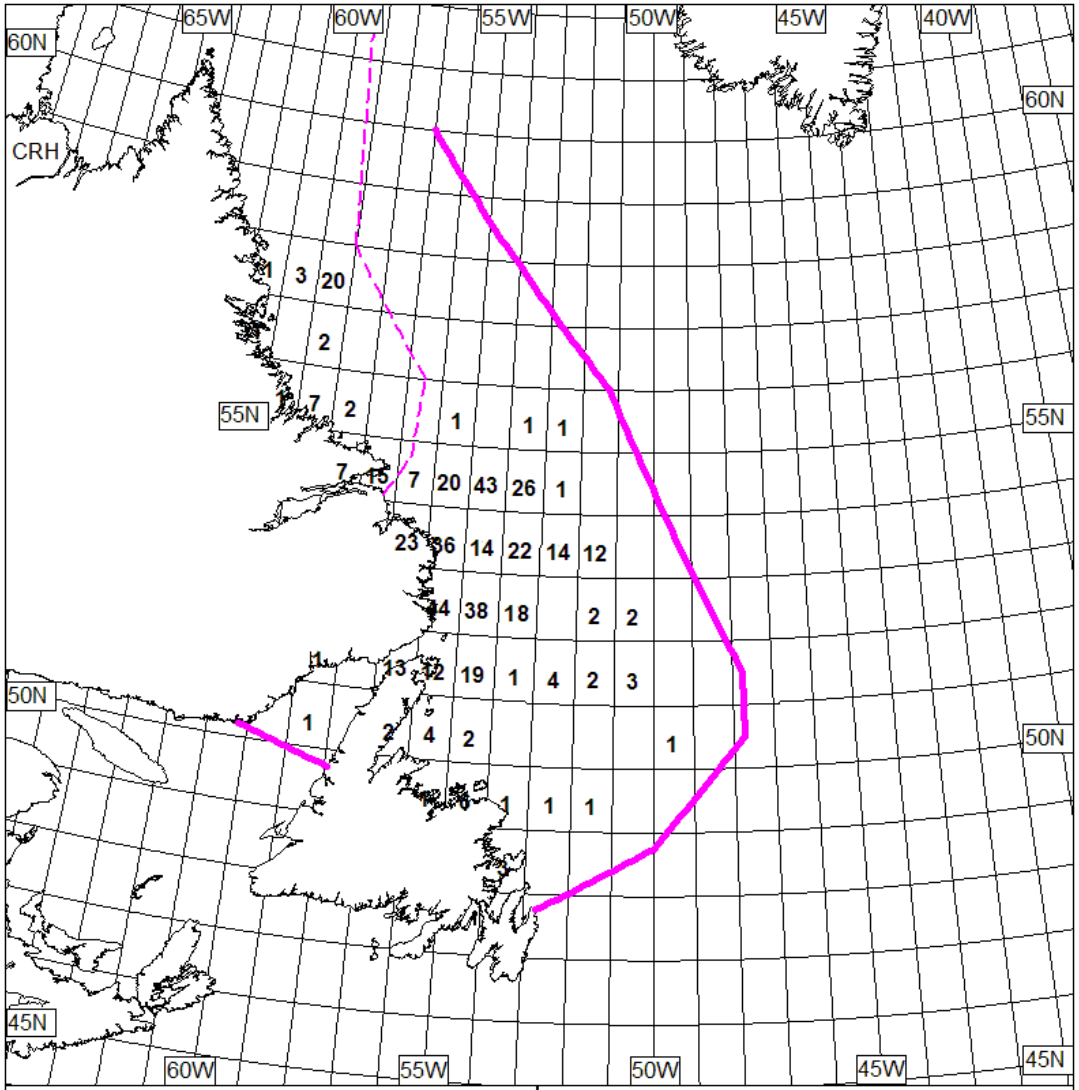
Limit further south – fly once per month.

Satellite surveillance as available.

D & E Limit here – fly every 5-10 days.

NAIS alysis





NORTH AMERICAN ICE SERVICE
SERVICE DES GLACES
DE L'AMERIQUE DU NORD

ICEBERG ANALYSIS / ANALYSE D'ICEBERGS
FOR / POUR 1200 UTC

01 JUN / JUN 2011

ICEBERG LIMIT / LIMITE DES ICEBERGS

SEA ICE LIMIT / LIMITE DES GLACES

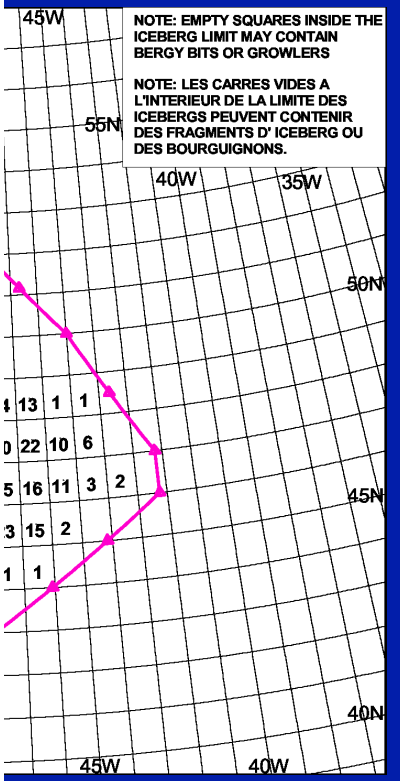
\# ICEBERGS PER DEGREE SQUARE
ICEBERGS PAR DEGRE CARRE

⊗ RADAR TARGET OUTSIDE ICEBERG LIMIT
CIBLE RADAR A L'EXTERIEUR DE LA LIMITE DES ICEBERGS

NOTE / NOTER:

SIGNIFICANT REDUCTION OF ICEBERG LIMIT

REDUCTION SIGNIFICATIVE DE LA LIMITE DES ICEBERGS



Benefits of Joint Mission Execution

- *Reduced redundancy*
  - *reduced chart production ~33%*
  - *consolidated text products*

- *Improved efficiency*
  - *continuity of operations*
  - *reconnaissance coordination/strategy*

- *Improved service to mariners*
  - *<u>seamless</u> products, distribution, reporting*
  - *met IMO standard*

NAIS Initiatives

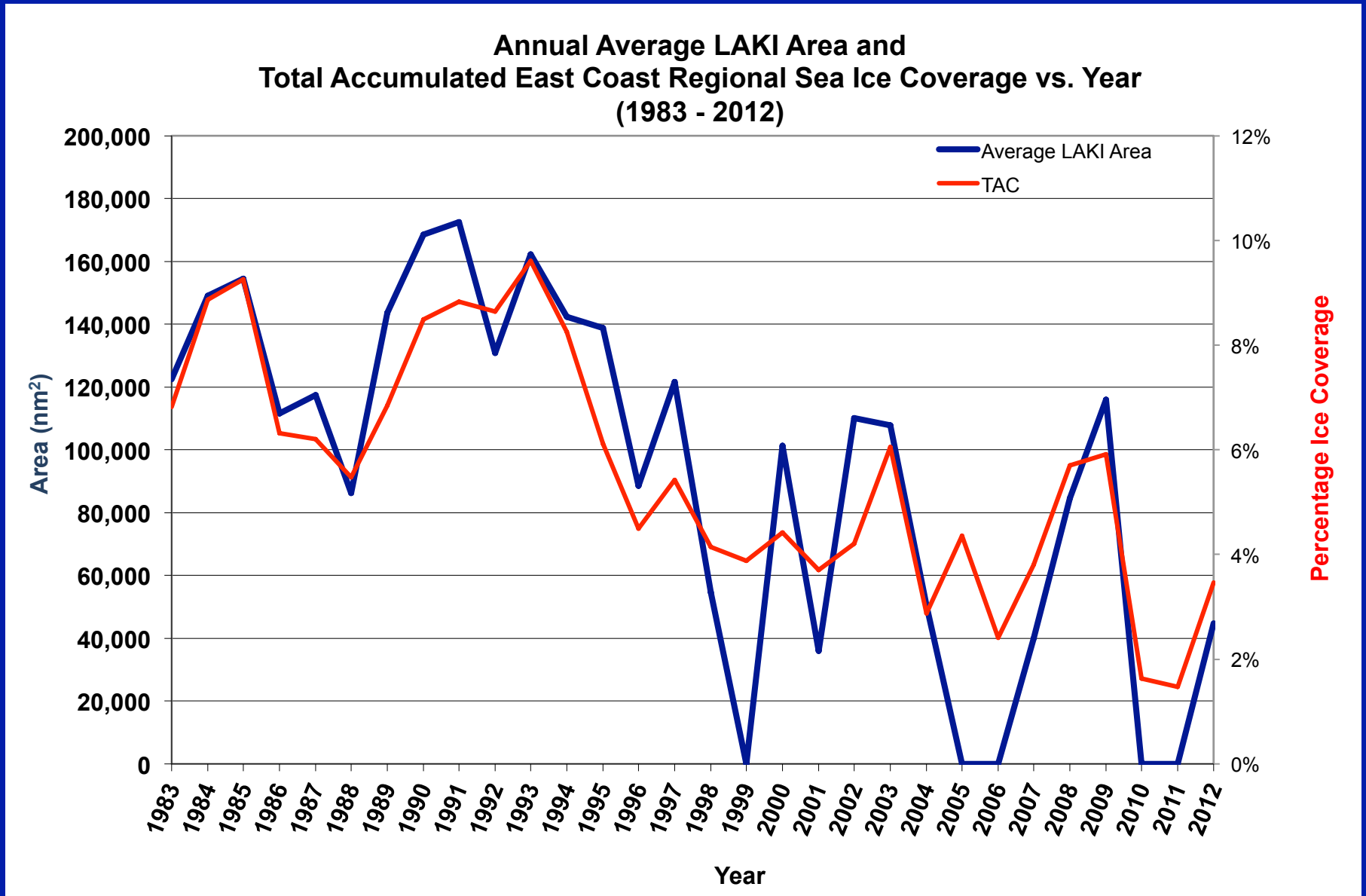
<u>2013+:</u>

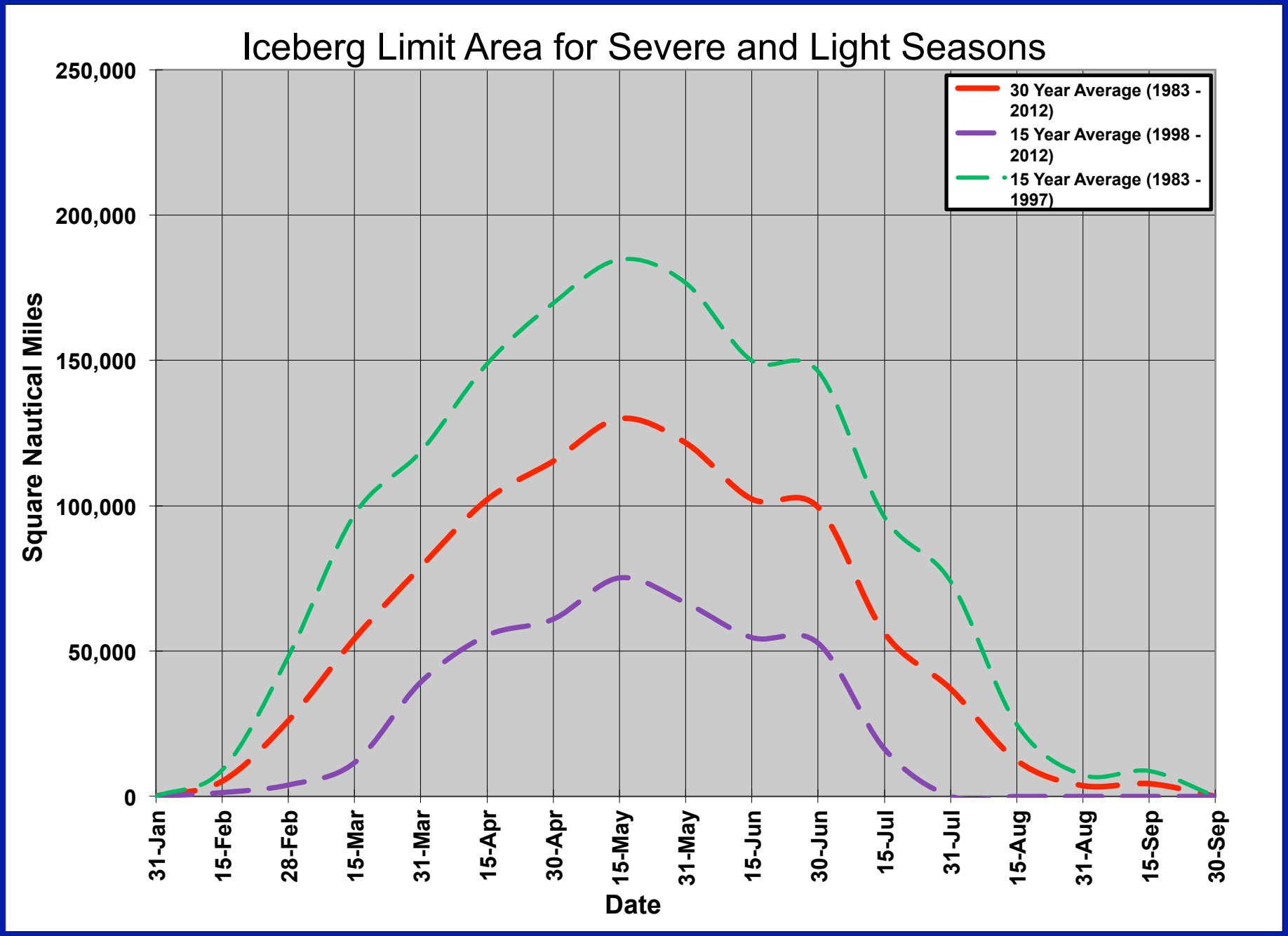
- *Refine NAIS reconnaissance strategy*
- *Iceberg Analysis and Prediction System replacement*
- *Continue NAIS model operational evaluation*
- *Continue satellite/UAV evaluation*
- *Develop ECDIS product*

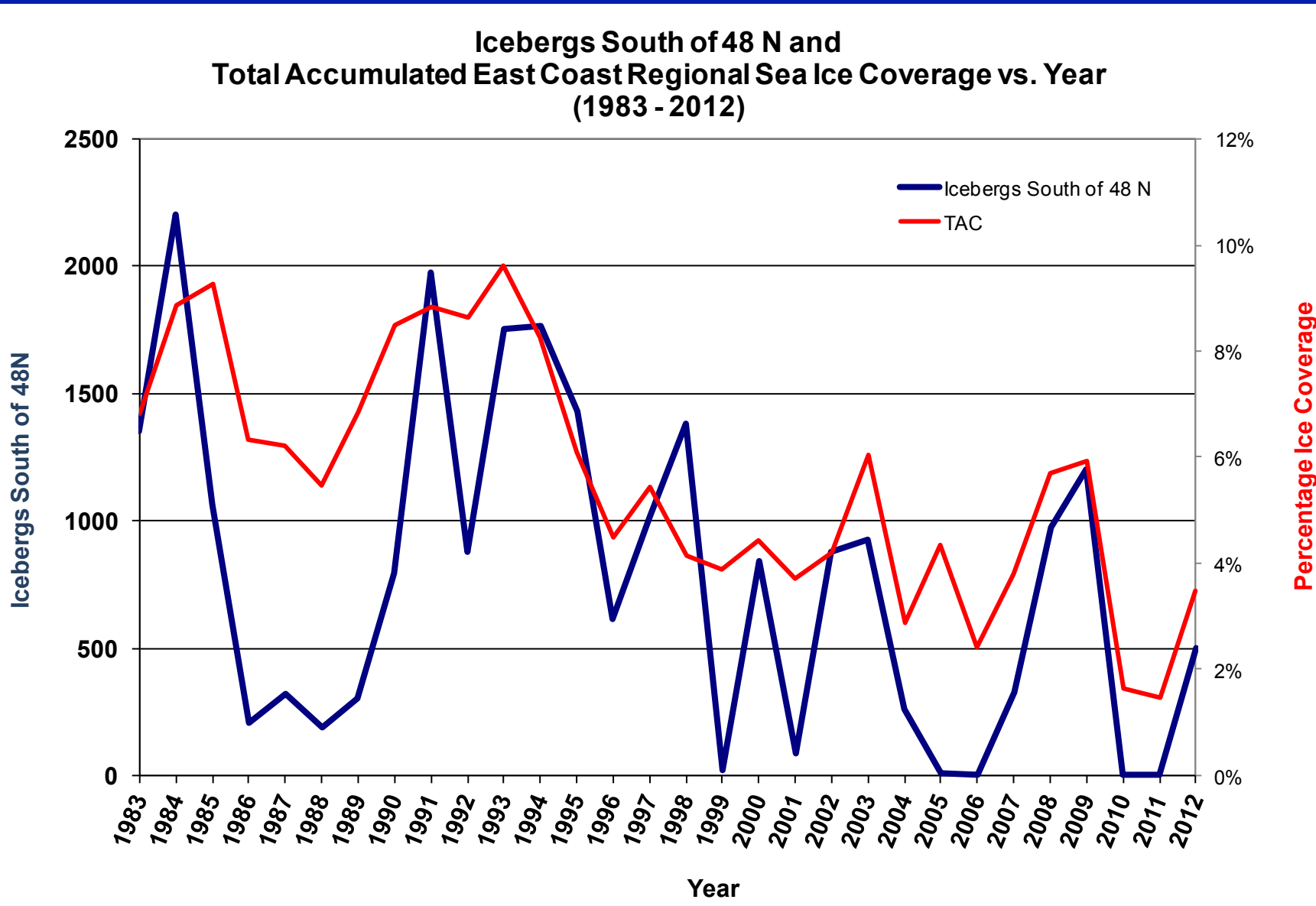
Future Customer Needs?

<u>Transatlantic Mariners:</u> Iceberg Limit with density remains sufficient

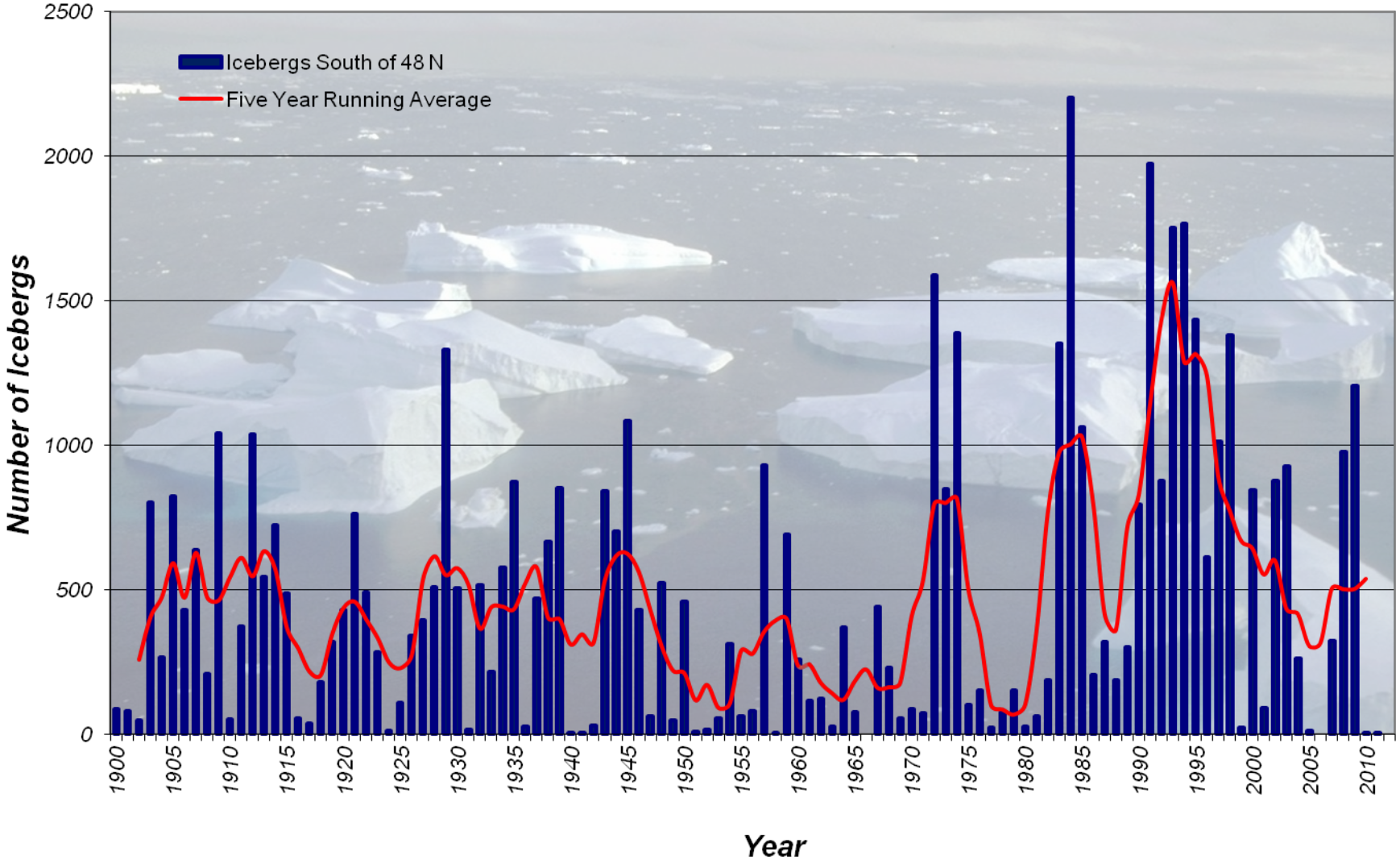
<u>Subpolar Mariners:</u> Iceberg Limit with density sufficient or will individual iceberg positions be desired/feasible?


Annual Average LAKI Area and
Total Accumulated East Coast Regional Sea Ice Coverage vs. Year
(1983 - 2012)
Average LAKI Area
TAC
Area (nm²)
Percentage Ice Coverage
Year
200,000
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
12%
10%
8%
6%
4%
2%
0%
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012

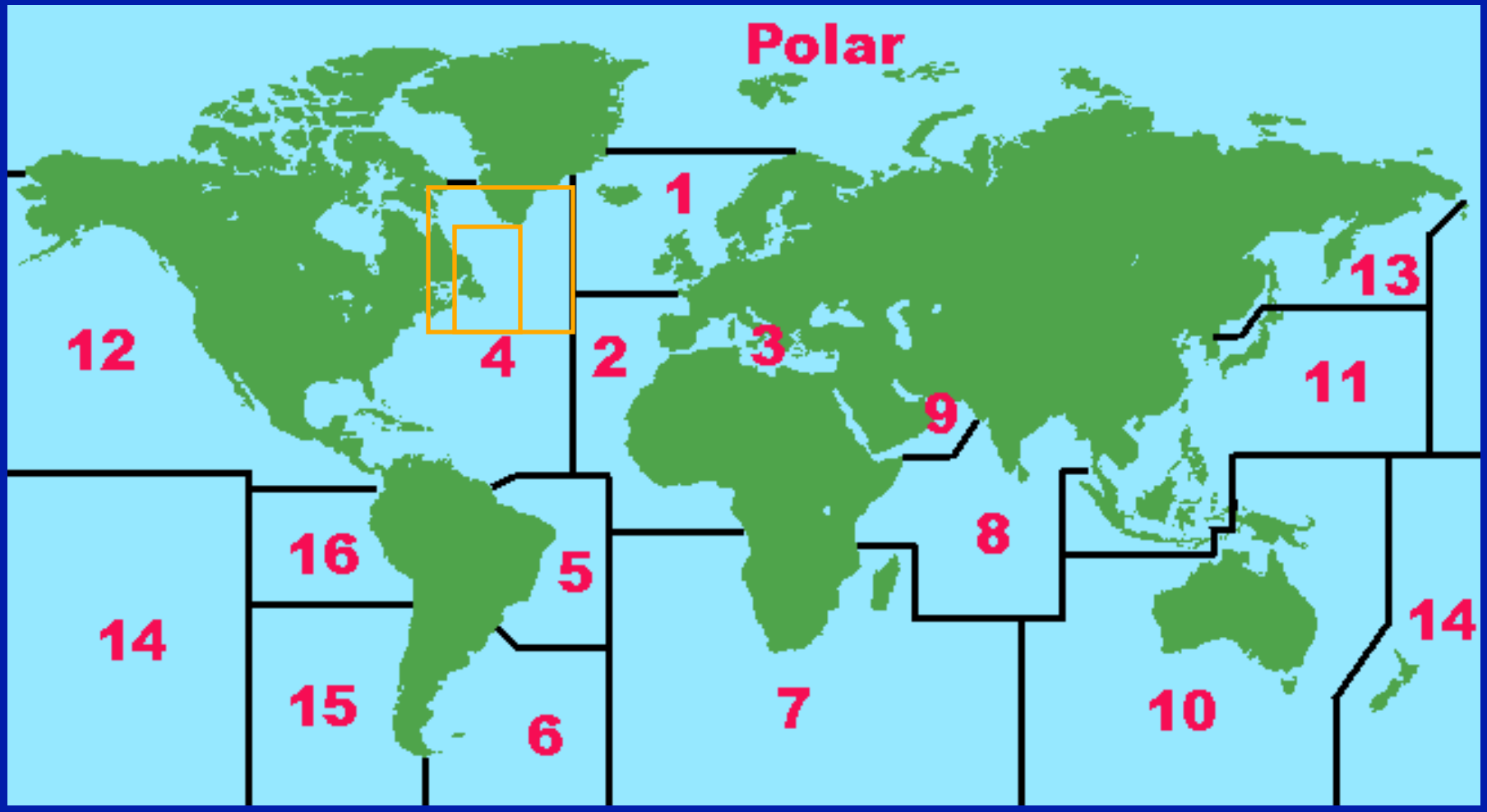

Iceberg Limit Area for Severe and Light Seasons
30 Year Average (1983 - 2012)
15 Year Average (1998 - 2012)
15 Year Average (1983 - 1997)
Square Nautical Miles
250,000
200,000
150,000
100,000
50,000
0
31-Jan
15-Feb
28-Feb
15-Mar
31-Mar
15-Apr
30-Apr
15-May
31-May
15-Jun
30-Jun
15-Jul
31-Jul
15-Aug
31-Aug
15-Sep
30-Sep
Date


Icebergs South of 48 N and
Total Accumulated East Coast Regional Sea Ice Coverage vs. Year
(1983 - 2012)
Icebergs South of 48 N
TAC
Icebergs South of 48N
Percentage Ice Coverage
Year
2500
2000
1500
1000
500
0
12%
10%
8%
6%
4%
2%
0%
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012

Number of Icebergs Estimated to have Passed South of 48 N



Future Area of Responsibility?



Future of Mission Execution?

Immediate Future (2014)

Execute NAIS reconnaissance strategy

Near Future (2015-2020)

Incorporate commercial reconnaissance to supplement USCG for IIP

Incorporate satellite and other data sources

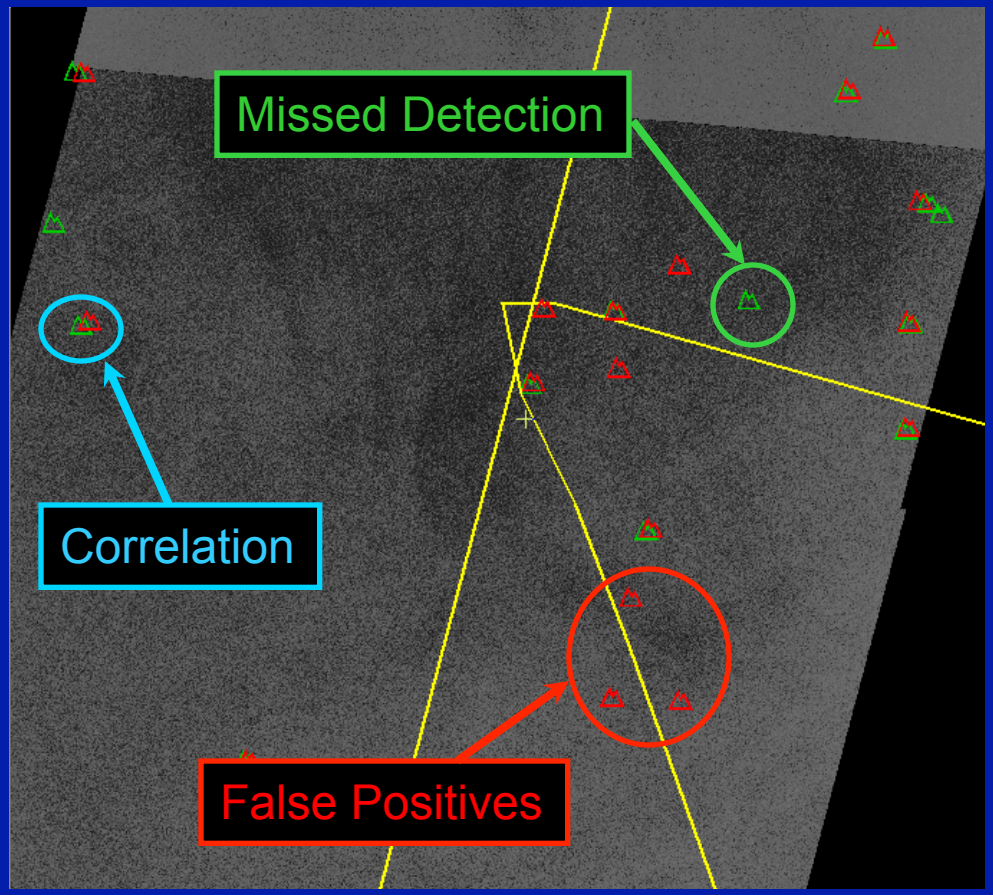
Eventual Future (~2020+)

Rely primarily on satellite and other data sources

(such as AIS, ELINT, LRIT, VMS)

Space-Borne Reconnaissance

- *Challenges:*
  - *Access*
  - *Cost*
  - *Coverage*
  - *Discrimination*
  - *Resolution*
- *IIP/CIS studies in 2011*
- *NAIS evaluation in 2012*
  - *Radarsat-2 - C-CORE*
  - *TerraSar X - NIC*
  - *Underflight - IIP*



Summary

- *Icebergs remain a danger to mariners within the NAIS area of responsibility*
- *The iceberg population south of 48N has historically exhibited significant interannual variability that is expected to continue*
- *NAIS customer needs may require more detailed information and/or an expanded area of responsibility in the future*
- *NAIS mission execution will depend on funding, resources, and evolving technology*
- *Moving to satellite and other data sources requires development of infrastructure and expertise for required data fusion*


Questions?